

FACT SHEET Eng-16

LIVE STAKES

November 1994

What Are They?

Live staking involves the insertion and tamping of live, rootable dormant vegetative cuttings into the ground. If correctly prepared and placed, the live stake will root and grow, developing a stand of woody plant material.

Why Use Them?

A system of stakes creates a living root mat that stabilizes the soil by reinforcing and binding soil particles together and by extracting excess soil moisture. Properly selected woody species root rapidly and begin to dry out a slope soon after installation. Dense root mass also can prevent erosive forces from dislodging and moving soil particles.

Where Should This Be Used

This technique is for relatively uncomplicated upland site conditions, and uncomplicated shoreline sites with low velocities and wave heights. These stakes may be used to anchor surface erosion control materials, and to repair small earth slips and slumps that are largely surficial erosion.

Guidelines

- Cuttings are usually 0.5 to 1.5 inches in diameter and 2-3 feet long.
- Cuttings should be taken from vigorous, undamaged, disease and insect free stock, and either be native or adapted to the planting site.
- Materials must have side branches cleanly removed and bark intact.
- The basal ends should be cut at an angle for easy insertion into the soil. The top should be square. Stakes should be planted with butt end into the ground. Buds should be oriented up.
- Materials should be installed the same day that they are prepared. They must not be allowed to dry out; store materials in water or in a cool, shaded, wet environment.
- Plants should be both cut and installed when they are dormant; that is, prior to bud swell and leaf emergence in the spring and after leaves have turned color and fallen off in the fall. Periodic pruning or replanting may be required.

Installation

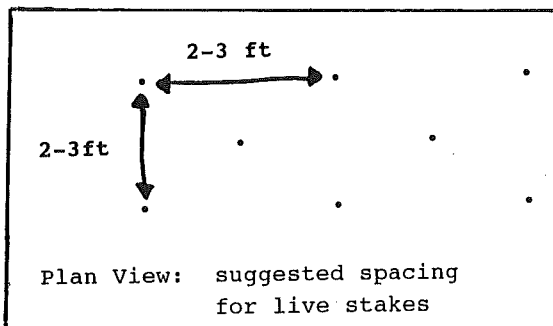
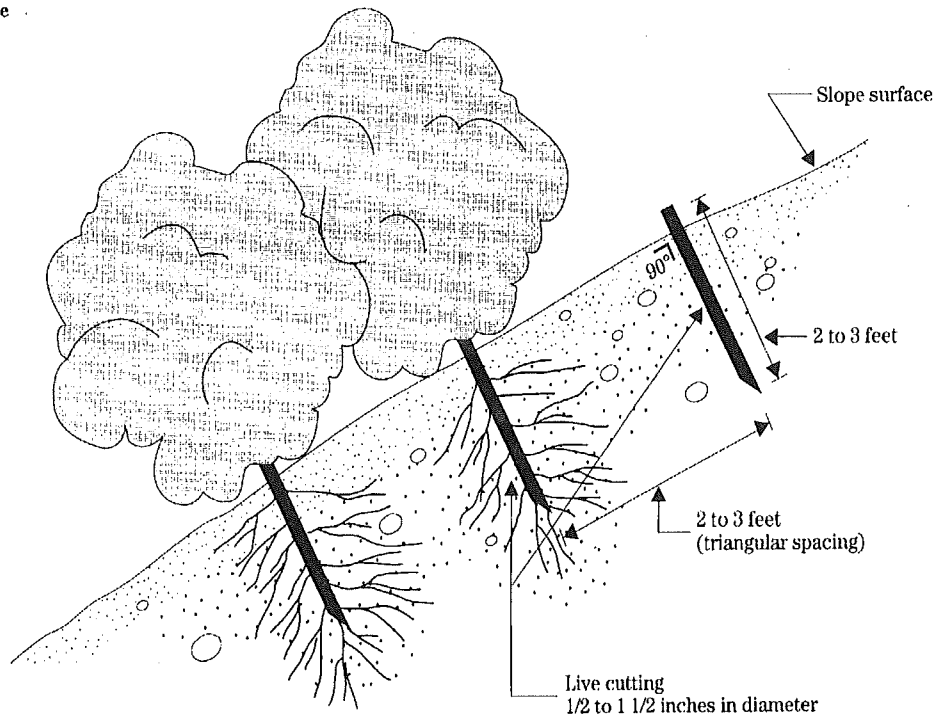
- Tamp the live stake into the ground at right angles to the slope face.
- Live stakes should be installed 2-3 feet apart using triangular spacing. Stakes should be placed with 2 to 4 stakes per square yard.
- Buds should be oriented up.
- Four fifths of the length of the live stake should be installed into the ground and soil firmly packed around it after installation.
- Stakes that split during installation should be removed and replaced.

- An iron bar can be used to make a pilot hole in firm soil. Drive the live stake into the ground with a dead blow hammer (hammer head filled with shot or sand).
- Bare slopes may be seeded, mulched or both.

For More Information

Contact the local Natural Resources Conservation Service (NRCS) or the Soil and Water Conservation District (SWCD) in your county.

Cross section
Not to scale



Note: Rooted/leafed condition of the living plant materials is not representative of the time of installation

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FACT SHEET Eng-17

LIVE FASCINE

November 1994

What Are They?

Live fascines are long bundles of dormant branch cuttings bound together into sausage-like structures. They may also be called a wattle.

Why Use Them?

Live fascines root easily and immediately begin to stabilize slopes. They are placed in shallow contour trenches on dry slopes and at an angle on wet slopes to reduce erosion and shallow face sliding.

Where Should This Be Used?

This technique is for relatively uncomplicated upland site conditions, and uncomplicated shoreline sites with low velocities and wave heights, or to control erosion on moderate upland slopes.

Guidelines

- Cuttings tied together to form live fascine bundles vary in length from 5 to 30 feet, depending on site conditions and limitations in handling.
- Completed bundles should be 6 to 8 inches in diameter with all of the growing tips oriented in the same direction. Stagger the cuttings in the bundles so that the tops are evenly distributed throughout the length of the fascine.
- Fascines may be secured with live stakes or dead stout stakes. Live stakes used to anchor the fascines should be 2.5 feet long in cut slopes and 3 feet long in fill slopes.
- Dead stout stakes used to secure the live fascines should be 2.5 feet long, untreated 2 x 4 lumber. Each length should be cut again diagonally across the 4 inch face to make two stakes from each length. String used for bundling should be untreated twine. (see diagram)
- The best planting times are in late fall at the onset of plant dormancy or in early spring before growth begins. Periodic pruning or replanting may be required.

Installation

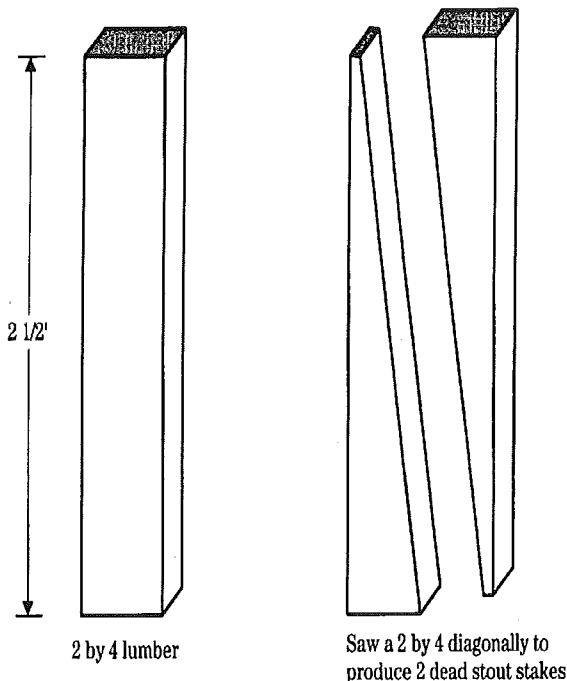
- Prepare the live fascine bundles and live stakes immediately before installation. Do not allow the bundles to dry out.
- Beginning at the base of the slope, dig a trench on the contour just large enough to contain the live fascine. The trench will be 12" to 18" in width depending on the angle of the slope to be treated. The depth will be 6" to 8" depending on the individual bundle's final size.
- Drive the dead stout stakes directly through the live fascine every 2 to 3 feet along its length. Extra stakes should be used at connections or bundle overlaps. Leave the top of the stakes flush with the installed bundle.

- Live stakes are generally installed on the downslope side of the bundle. Drive the live stakes below and against the bundle between the previously installed dead stout stakes. The live stakes should protrude 2 to 3 inches above the top of the live fascine. Place moist soil along the sides of the live fascine. The top of the fascine should be slightly visible when installation is complete.
- Repeat these steps at intervals on the contour or at an angle up the face of the bank to reach the top of the slope. (See Table 1) When possible, place one or two rows over the top of the slope.
- Long straw or similar mulching material should be placed between rows on 2.5:1 or flatter slopes, while slopes steeper than 2.5:1 should have jute mesh or similar material placed in addition to the mulch. The slope may be seeded before mulching.

For More Information

Contact the local Natural Resources Conservation Service (NRCS), or the Soil and Water Conservation District (SWCD) in your county.

A dead stout stake

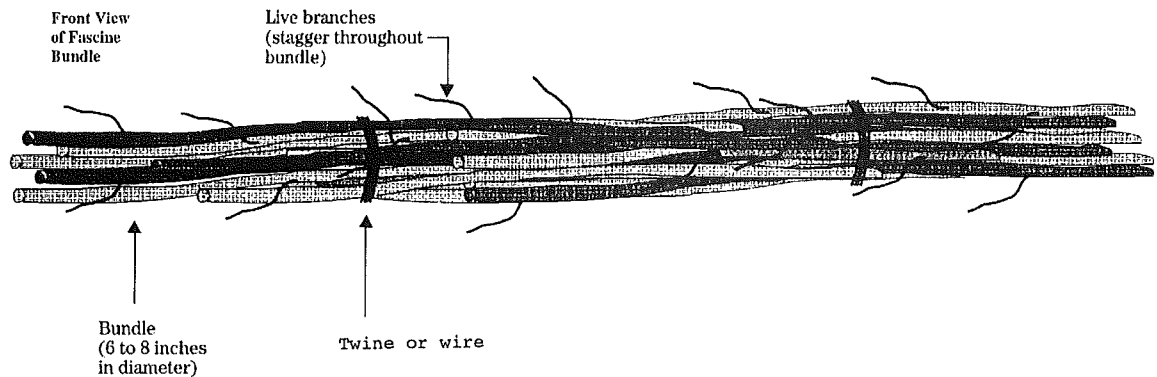
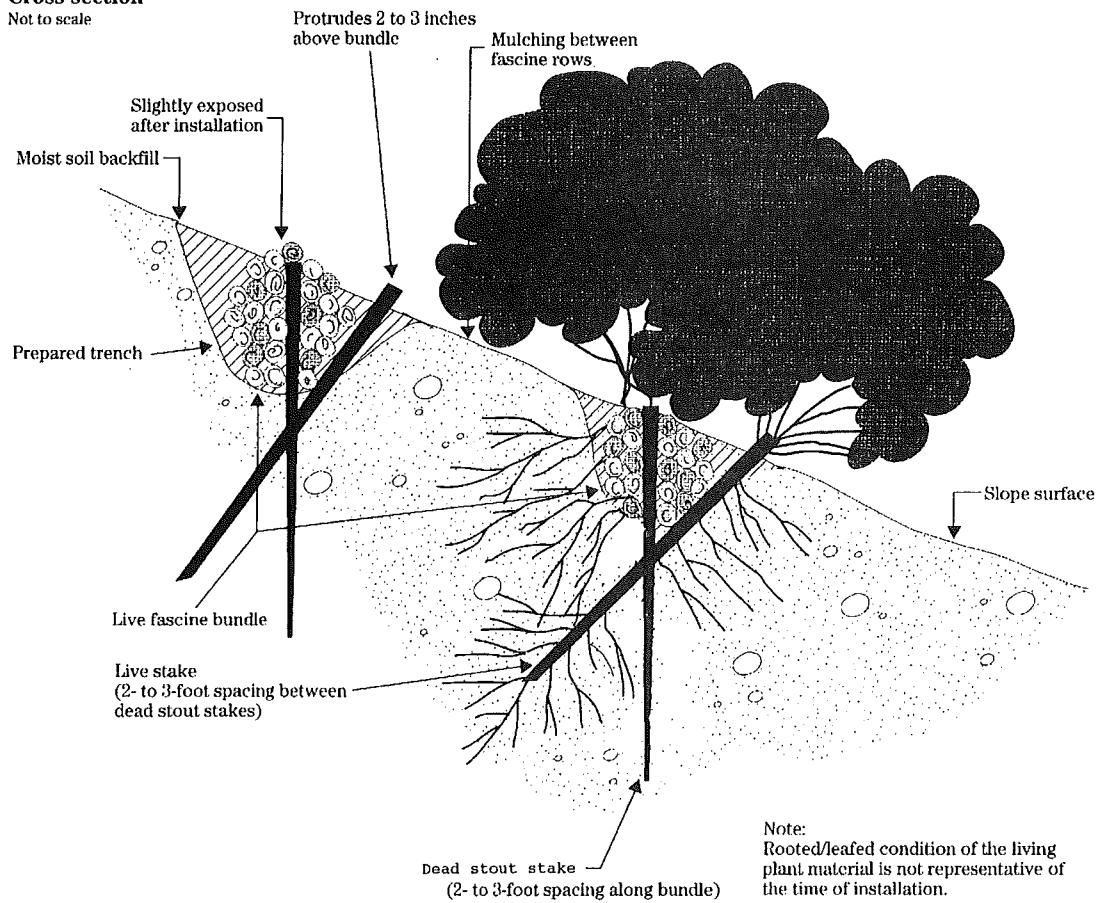


Not to scale

Table 1 Live fascine installation guidelines

Slope	Slope distance between trenches (ft)	Maximum slope length (ft)
1:1 to 1.5:1	3 - 4	15
1.5:1 to 2:1	4 - 5	20
2:1 to 2.5:1	5 - 6	30
2.5:1 to 3:1	6 - 8	40
3.5:1 to 4:1	8 - 9	50
4.5:1 to 5:1	9 - 10	60

Cross section
Not to scale



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FACT SHEET ENG-18

BRUSHLAYERING

November 1994

What Are They?

Brushlayering is the placement of live dormant branch cuttings in small benches excavated into a slope, perpendicular to the contour, for earth reinforcement and stabilizing the slope.

Why Use Them?

Brushlayer branches reinforce the soil with unrooted branch stems and as roots develop, add significant resistance to sliding or shear displacement. The portions of the brush that protrude from the slope face assist in retarding runoff, trapping debris and reducing surface erosion. Brushlayers may aid infiltration on dry sites and dry excessively wet sites.

Where Should This Be Used?

This technique is for relatively uncomplicated upland site conditions, and uncomplicated shoreline sites with low velocities and wave heights, or to control erosion on moderate upland slopes.

Guidelines

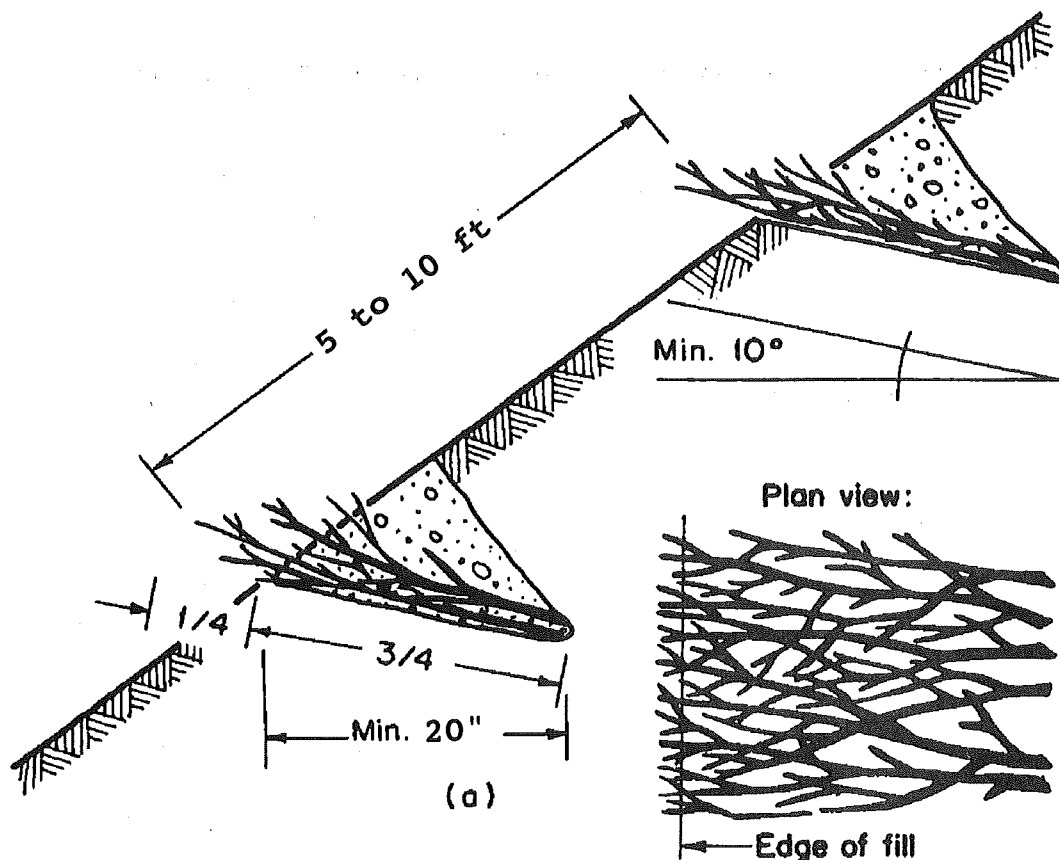
Branch cuttings should be 1/2 to 2 inches in diameter and long enough to reach the back of the bench. Side branches should remain intact for installation.

Installation

- Starting at the toe of the slope, benches should be excavated horizontally, on the contour, or angled slightly down the slope, if needed to aid drainage. The bench should be constructed 2 to 3 feet wide.
- The surface of the bench should be sloped so that the outside edge is higher than the inside.
- Live branch cuttings should be placed on the bench in a crisscross or overlapping configuration.
- Branch growing tips should be aligned toward the outside of the bench. Backfill is placed on top of the branches and compacted to eliminate air spaces. The brush tips should extend slightly beyond the fill to filter sediment.
- Each lower bench is backfilled with the soil obtained from excavating the bench above.
- The brushlayer rows should be 3 to 5 feet apart, depending on the slope angle and stability. See the table later in this fact sheet.
- Seeding is best accomplished between brushlayer rows when a mulch is used. Long straw or similar mulching material should be placed between rows on 3:1 or flatter slopes, while slopes steeper than 3:1 should have jute mesh or similar material placed in addition to the mulch.

For More Information

Contact the local Natural Resources Conservation Service (NRCS), or the Soil and Water Conservation District (SWCD) in your county.



Brushlayer installation guidelines

Slope	Slope distance between benches		Maximum slope length (ft)
	Wet slopes (ft)	Dry slopes (ft)	
2:1 to 2.5:1	3	3	15
2.5:1 to 3:1	3	4	15
3.5:1 to 4:1	4	5	20

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